US006651863B1

(12) **United States Patent**
Chen

(10) **Patent No.: US 6,651,863 B1**
(45) **Date of Patent: Nov. 25, 2003**

(54) **CAP ASSEMBLY FOR COVERING AN AIR RELEASE OPENING IN A HOUSING OF A NAIL DRIVING GUN**

(75) Inventor: **Robert Chen**, Tai-Ping (TW)

(73) Assignee: **Panrex Industrial Co., Ltd.**, Tai-Ping (TW)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/354,712**

(22) Filed: **Jan. 30, 2003**

(51) **Int. Cl.**[7] **B25C 1/04**
(52) **U.S. Cl.** **227/130**
(58) **Field of Search** 227/10, 130, 156, 227/8

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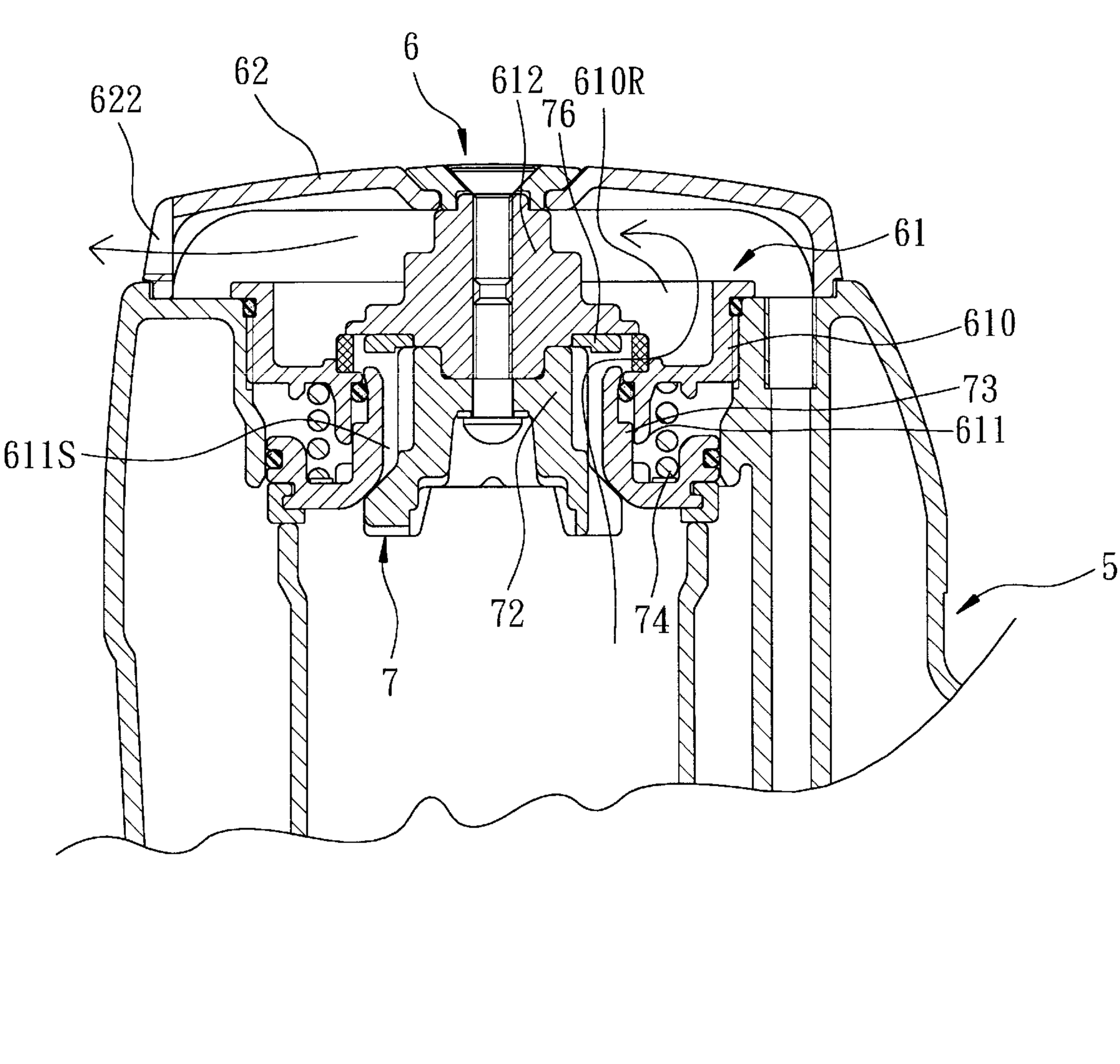
Primary Examiner—Scott A. Smith
(74) *Attorney, Agent, or Firm*—Ohlandt, Greeley, Ruggiero & Perle, L.L.P.

(57) **ABSTRACT**

A cap assembly for a nail driving gun includes a cylindrical body mounted detachably on an open end of a gun housing. The cylindrical body includes a first flange that defines an inner space and that is formed with an external thread engaging threadedly the open end of the housing, and a second flange that is reduced from the first flange, that extends into the housing, and that defines a receiving space in fluid communication with the inner space. A nut is disposed in the inner space. A cover with an air outlet is fastened to the nut through a bolt to cover the inner space. A sealing member is movably and sealingly disposed in the housing for sealing the receiving space during a nail impelling operation.

2 Claims, 5 Drawing Sheets



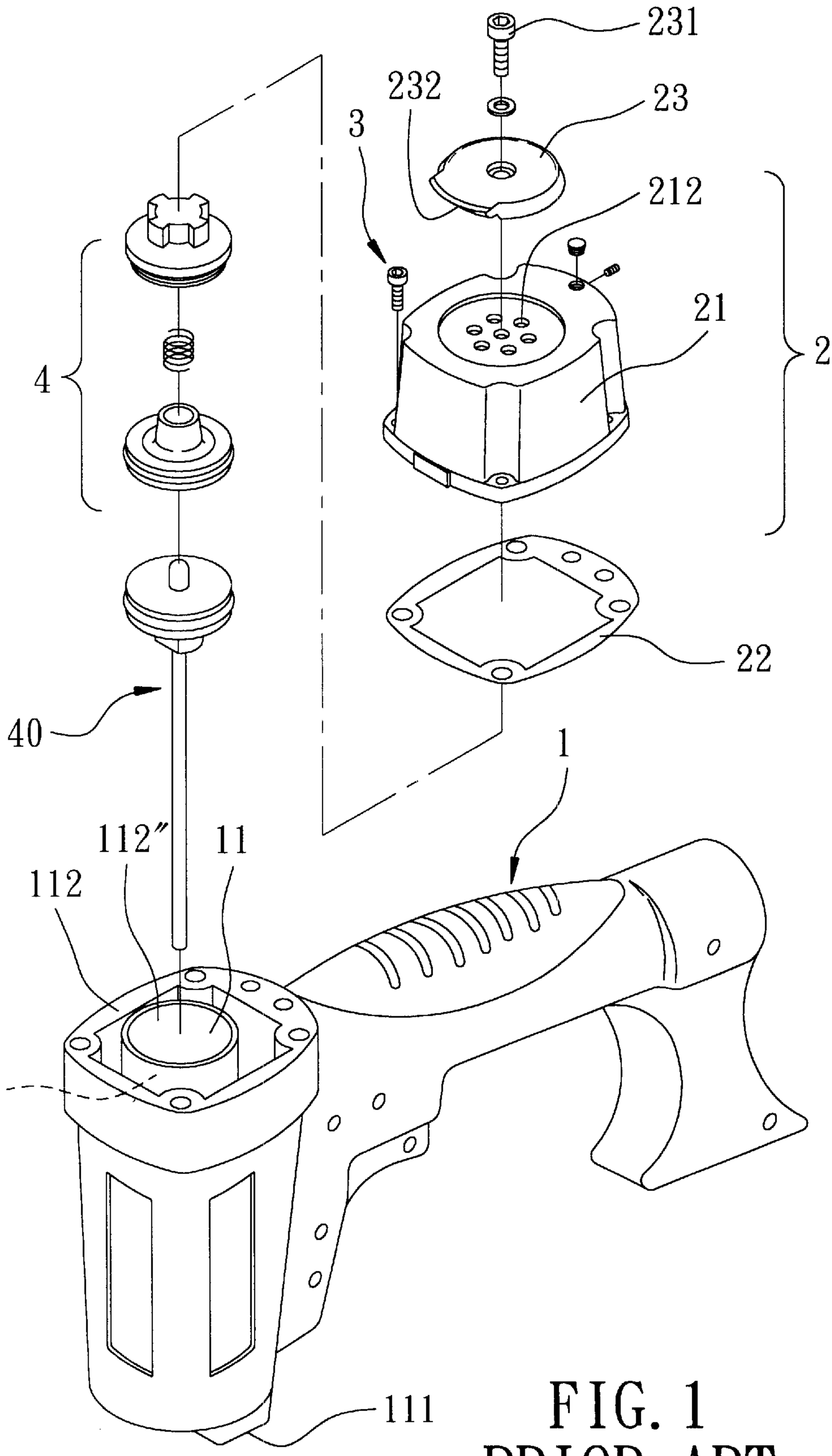


FIG. 1
PRIOR ART

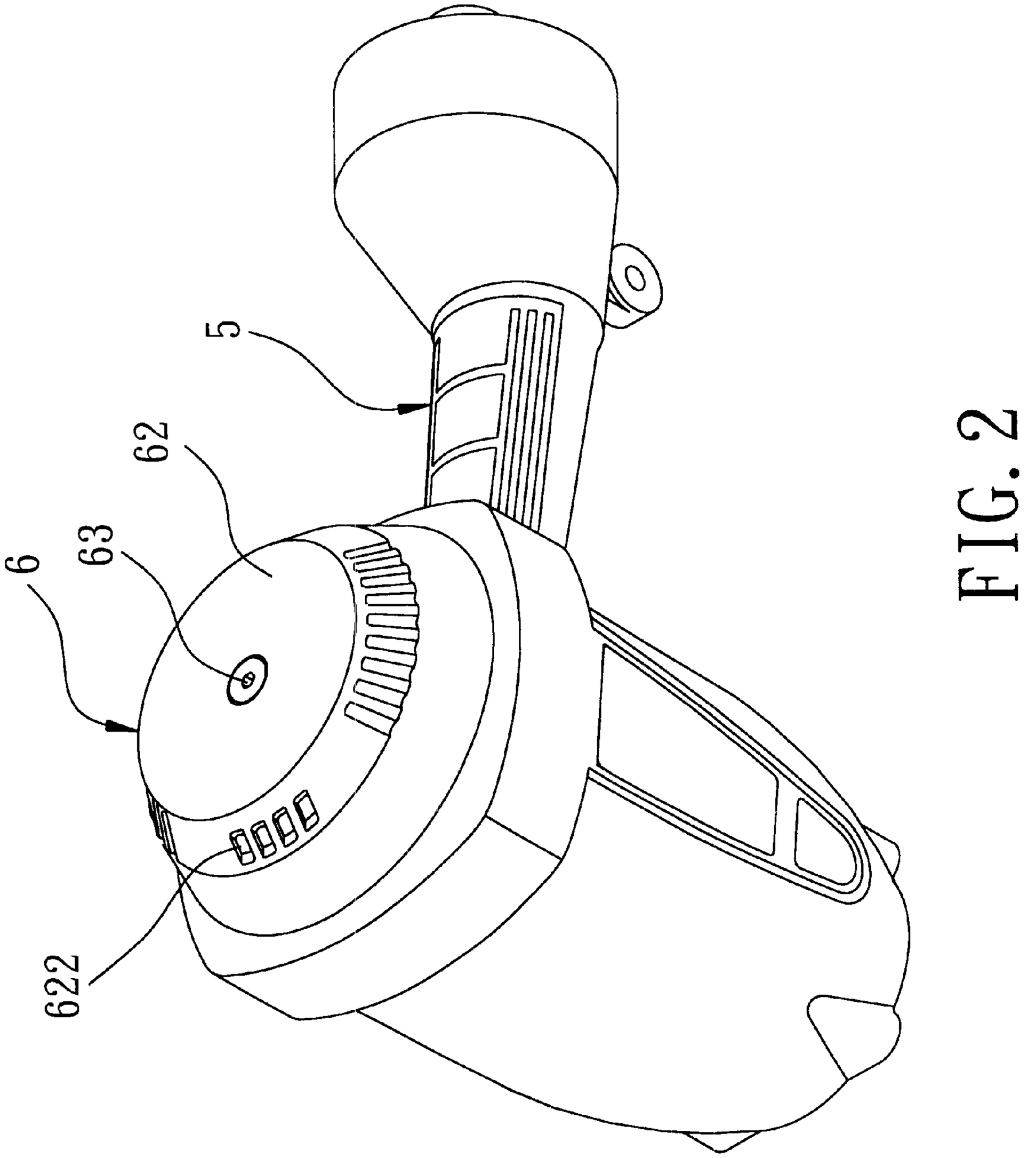


FIG. 2

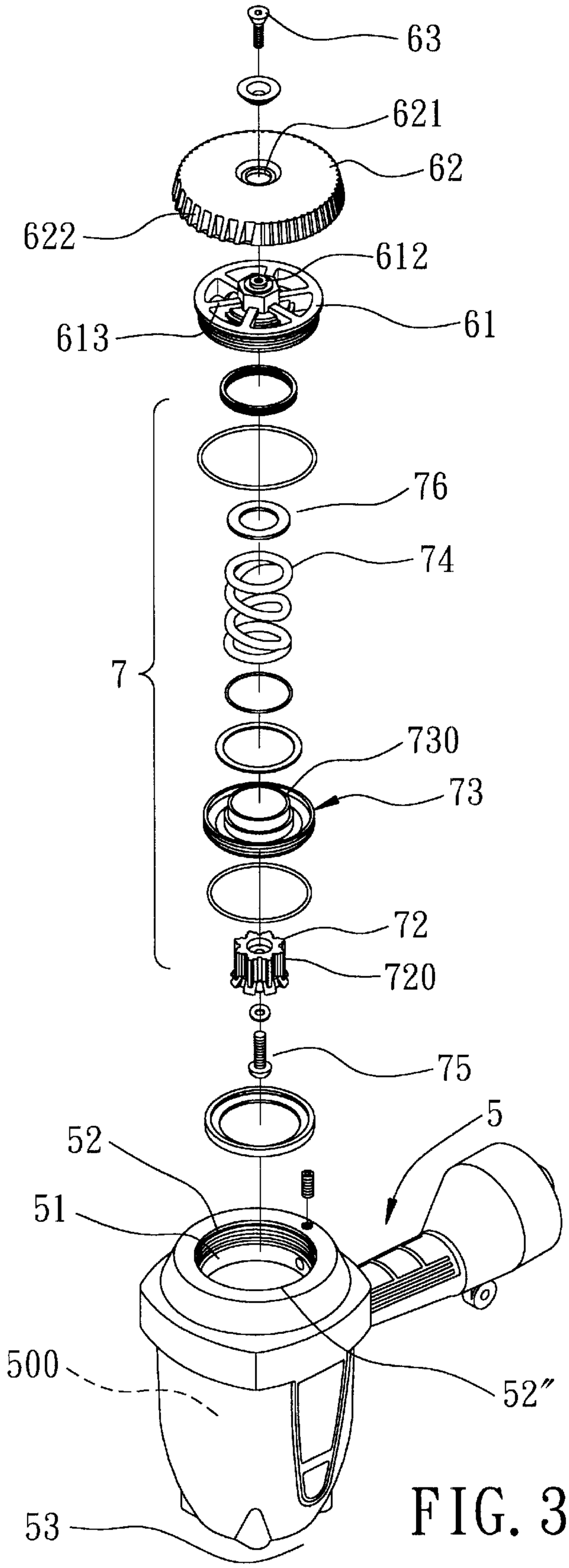


FIG. 3

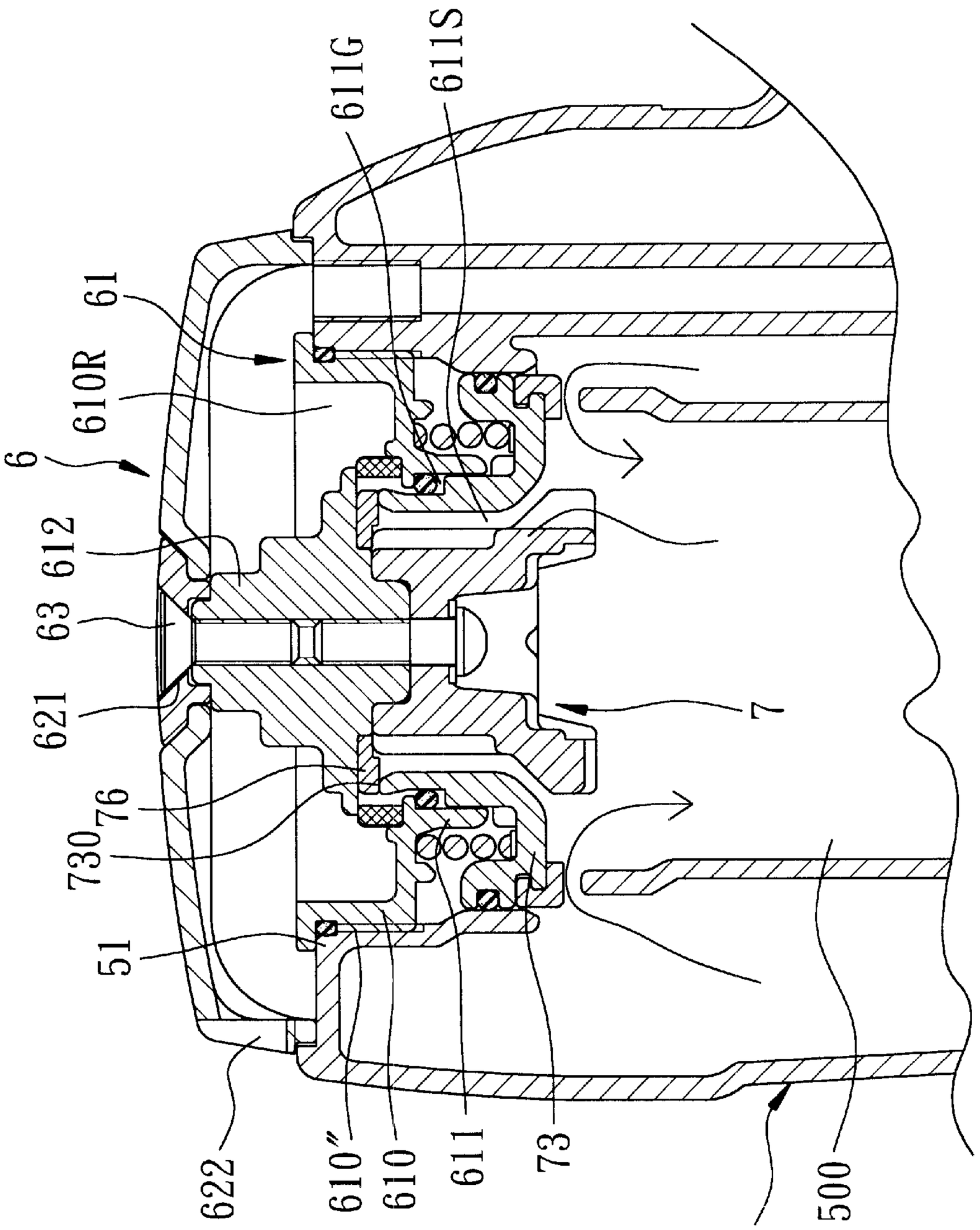


FIG. 4

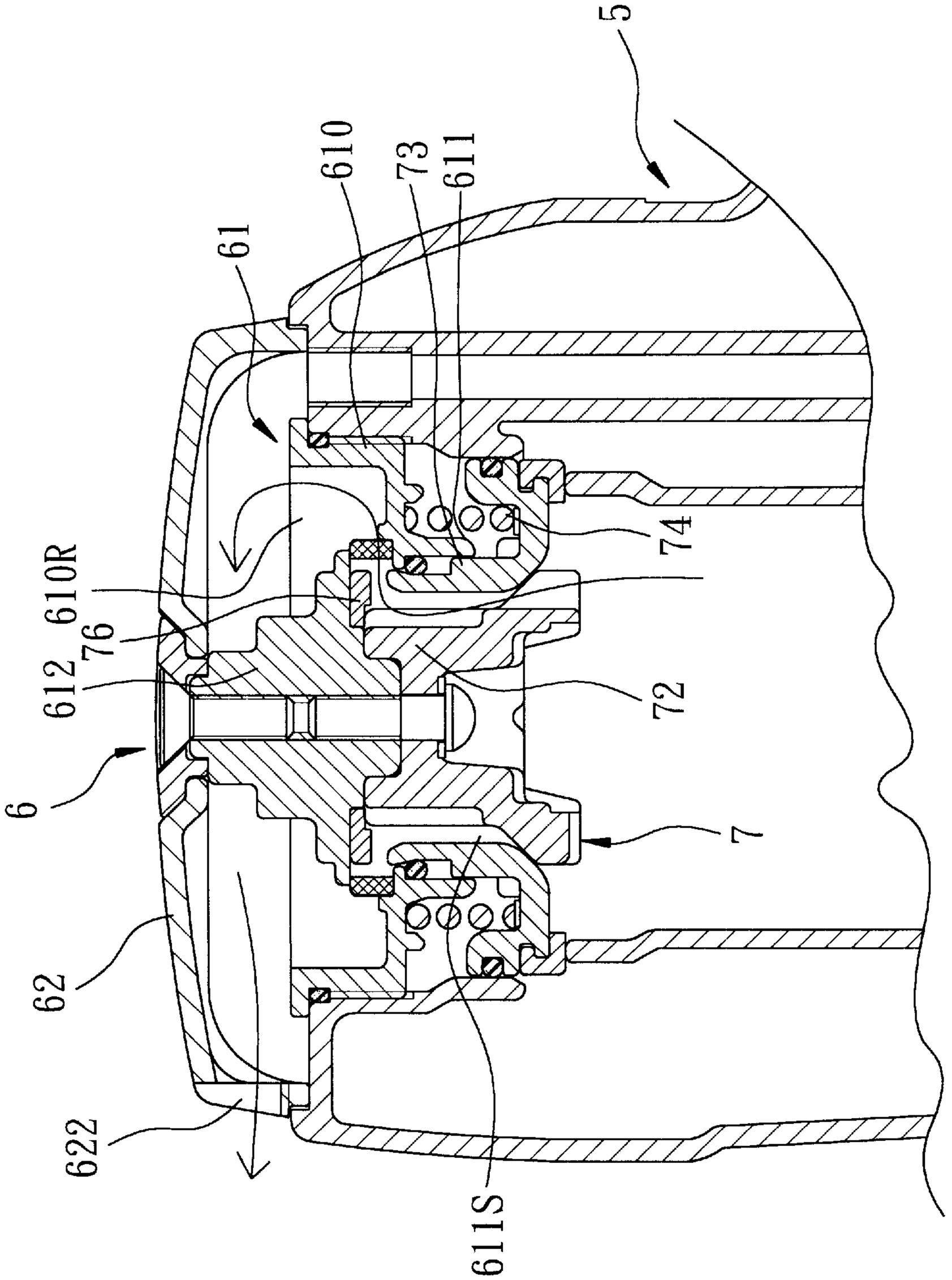


FIG. 5

CAP ASSEMBLY FOR COVERING AN AIR RELEASE OPENING IN A HOUSING OF A NAIL DRIVING GUN

FIELD OF THE INVENTION

The invention relates to a nail driving gun, more particularly to a cap assembly for covering an air release opening in a housing of the nail driving gun.

BACKGROUND OF THE INVENTION

Referring to FIG. **1**, a conventional nail driving gun is shown to include a gun housing **1**, a cap assembly **2**, a spring-loaded sealing member **4**, and a pneumatically driven piston unit **40**.

As illustrated, the gun housing **1** has an inner wall **11** confining a chamber **110**, a nail-discharging end **111**, an open end **112** that is opposite to the nail-discharging end **111** and that defines an air release opening **112**" which is in fluid communication with the chamber **110**. The piston unit **40** is movably disposed in the chamber **110** for discharging a nail through the nail-discharging end **111** of the gun housing **1** upon introduction of a high pressure into the chamber **110**. The cap assembly **2** is mounted detachably on the open end **112** of the gun housing **1** for covering the air release opening **112**", and includes a cover **21** that is fastened detachably to an end face of the open end **112** of the gun housing **1** via a plurality of fastener bolts **3** and a packing **22**, and that is formed with a plurality of air outlets **212**, and a guide **23** detachably mounted on the cover **21** via a locking screw **231**. The guide **23** is formed with at least one outlet hole **232** in spatial communication with the air release opening **112**" through the air outlets **212** in the cover **21**. The sealing member **4** is disposed sealingly and movably in the chamber **110**, and is operably associated with the piston unit **40** for selectively and sealingly covering the air release opening **112**" in the gun housing **1**.

One drawback of the aforesaid conventional nail driving gun resides in that it is inconvenient to mount and dismount the cap assembly **2** on and from the open end **112** of the gun housing **1**.

SUMMARY OF THE INVENTION

Therefore, the object of this invention is to provide a cap assembly for covering an air release opening in a gun housing of a nail driving gun, which can be mounted on or dismounted from the gun housing in a convenient manner.

A pneumatically operated nail driving gun of the present invention includes a gun housing, a cap assembly, and a sealing member. The gun housing has an inner wall confining a chamber, a nail-discharging end, and an open end that is opposite to the nail-discharging end and that defines an air release opening which is in fluid communication with the chamber. The inner wall is formed with an internal thread that extends inwardly from the open end. The cap assembly is mounted detachably on the open end of the gun housing for covering the air release opening. The cap assembly includes a cylindrical body having an annular first flange portion that confines an inner space and that is formed with an external thread engaging the internal thread of the inner wall, and an annular second flange portion that is reduced coaxially from said first flange portion, that extends into the chamber and that defines a receiving space in spatial communication with the inner space. The cap assembly further includes a nut disposed coaxially within the inner space, and

a plurality of ribs which extend radially from the first flange portion to connect with the nut. A cover is detachably mounted on the first flange portion for covering the inner space, and is formed with at least one air outlet which is in fluid communication with the inner space. A fastener bolt extends through the cover, and engages the nut threadedly. The sealing member is disposed movably in the chamber, and includes a cylindrical fixed sealing part, an annular sealing ring, and a movable sealing part. The fixed sealing part is coaxially disposed within the receiving space, is secured to the nut, and cooperates with the second flange portion to define a gap therebetween. The sealing ring is coaxially disposed above the fixed sealing part and abuts against the nut. The movable sealing part is slidably and sealingly inserted into the gap, has a top end formed with an abutment end face, and is movable relative to the fixed sealing part between a first position, in which the abutment end face of the movable sealing part abuts sealingly against the sealing ring so as prevent fluid communication between the chamber and the inner space, and a second position, in which the movable sealing part moves away from the sealing ring, thereby permitting release of air through the receiving space, the inner space, and the air outlet in the cover. An urging member urges the movable sealing part to the second position.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of this invention will become more apparent in the following detailed description of the preferred embodiment of this invention, with reference to the accompanying drawings, in which:

FIG. **1** is an exploded perspective view of a conventional nail driving gun;

FIG. **2** is a perspective rear view of the preferred embodiment of a nail driving gun according to the present invention;

FIG. **3** is an exploded perspective rear view of the preferred embodiment;

FIG. **4** is a fragmentary sectional view of the preferred embodiment, illustrating how a high pressure is introduced into a gun housing of the preferred embodiment in order to impel a nail from the gun housing; and

FIG. **5** is a fragmentary sectional view of the preferred embodiment, illustrating how the pressure within the gun housing is released through a cap assembly that is mounted on an open end of the gun housing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. **2**, **3** and **4**, the preferred embodiment of a nail driving gun of the present invention is shown to include a gun housing **5**, a cap assembly **6**, and a sealing member **7**.

As illustrated, the gun housing **5** has an inner wall **51** confining a chamber **500**, a nail-discharging end **53**, and an open end **52** that is opposite to the nail-discharging end **53** and that defines an air release opening **52**" which is in fluid communication with the chamber **500**. The inner wall **51** is formed with an internal thread that extends inwardly from the open end **52** of the gun housing **5**.

The cap assembly **6** is mounted detachably on the open end **52** of the gun housing **5** for covering the air release opening **52**". The cap assembly **6** includes a hollow cylindrical body **61**, a cover **62**, and a fastener bolt **63**. The cylindrical body **61** has an annular first flange portion **610**

that defines an inner space **610**R and that is formed with an external thread **610**" engaging threadedly the internal thread of the inner wall **51**, and an annular second flange portion **611** that is reduced coaxially from the first flange portion **610**, that extends into the chamber **500**, and that defines a receiving space **611**S in spatial communication with the inner space **610**R. The cap assembly **6** further includes a nut **612** disposed coaxially within the inner space **610**R, and a plurality of ribs **613** which extend radially from the first flange portion **610** to connect with the nut **612**. The cover **62** is detachably mounted on the first flange portion **610** for covering the inner space **610**R, and is formed with a plurality of air outlets **622** which are in fluid communication with the inner space **610**R. The fastener bolt **63** extends through a hole **621** in the cover **62** and engages the nut **612** threadedly.

The sealing member **7** is disposed movably in the chamber **500** of the gun housing **5**, and includes a cylindrical fixed sealing part **72**, a sealing ring **76**, and a movable sealing part **73**. The fixed sealing part **72** is coaxially disposed within the receiving space **611**S, is secured to the nut **612** through a locking bolt **75**, and cooperates with the second flange portion **611** to define a gap **611**G therebetween (see FIG. **4**). The sealing ring **76** is coaxially disposed above the fixed sealing part **72**, and abuts against the nut **612**. The movable sealing part **73** has a top end formed with an annular abutment end face **730**, and is inserted sealingly and slidably into the gap **611**G. The movable sealing part **73** is movable relative to the fixed sealing part **72** between a first position, in which the abutment end face **730** of the movable sealing part **73** abuts sealingly against the sealing ring **76** so as to prevent fluid communication between the chamber **500** and the inner space **610**R, as best shown in FIG. **4**, and a second position, in which the movable sealing part **73** moves away from the sealing ring **76**, thereby permitting release of air through the receiving space **611**S, the inner space **610**R, and the air outlets **622** in the cover **62**, as best shown in FIG. **5**.

The fixed sealing part **72** is preferably formed with a plurality of axial grooves **720** for passage of air therethrough when the movable sealing part **73** is positioned at the second position.

An urging member in the form a compression spring **74** is sleeved around the movable sealing part **73**, and urges the movable sealing part **73** to the second position.

Preferably, a pneumatically driven piston unit (not shown) is movably disposed in the chamber **500** of the gun housing **5**. The piston unit is adapted to discharge a nail through the nail-discharging end **53** of the gun housing **5** upon introduction of a high pressure into the chamber **500**. The movable sealing part **73** moves to the first position against the urging force of the compression spring **74** once the high pressure is introduced into the chamber **500** so as to sealingly close the receiving space **611**S. Immediately after the nail impelling operation, the movable sealing part **73** returns to the second position by virtue of a restoration force of the compression spring **74**. At this time, the pressure within the chamber **500** is released through the receiving space **611**S, the inner space **610**R, and the air outlets **622** in the cover **62**, as indicated by the arrow in FIG. **5**.

The ribs **613** interconnecting the nut **612** and the first flange portion **610** facilitate turning operation of the cylindrical body **61** relative to the open end **52** of the gun housing

5. With the cap assembly of this invention, the aforesaid drawback associated with the prior nail driving gun can be eliminated.

With this invention thus explained, it is apparent that numerous modifications and variations can be made without departing from the scope and spirit of this invention. It is therefore intended that this invention be limited only as indicated in the appended claims.

I claim:

1. A pneumatically operated nail driving gun comprising:

a gun housing having an inner wall confining a chamber, a nail-discharging end, and an open end that is opposite to said nail-discharging end and that defines an air release opening which is in fluid communication with said chamber, said inner wall being formed with an internal thread that extends inwardly from said open end;

a cap assembly mounted detachably on said open end of said gun housing for covering said air release opening, said cap assembly including a hollow cylindrical body having an annular first flange portion that confines an inner space and that is formed with an external thread engaging threadedly said internal thread of said inner wall, and an annular second flange portion that is reduced coaxially from said first flange portion, that extends into said chamber, and that defines a receiving space in spatial communication with said inner space, said cap assembly further including a nut disposed coaxially within said inner space, and a plurality of ribs which extend radially from said first flange portion to connect with said nut, said cap assembly further including a cover that is detachably mounted on said first flange portion for covering said inner space, and that is formed with at least one air outlet which is in fluid communication with said inner space, and a fastener bolt extending through said cover and engaging threadedly said nut;

a sealing member disposed movably in said chamber, and including a cylindrical fixed sealing part that is coaxially disposed within said receiving space, that is secured to said nut, and that cooperates with said second flange portion to define a gap therebetween, said sealing member further including an annular sealing ring disposed coaxially above said fixed sealing part and abutting against said nut, and a movable sealing part that is slidably and sealingly inserted into said gap, that has a top end formed with an abutment end face, and that is movable relative to said fixed sealing part between a first position, in which said abutment end face of said movable sealing part abuts sealingly against said sealing ring so as to prevent fluid communication between said chamber and said inner space, and a second position, in which said movable sealing part moves away from said sealing ring, thereby permitting release of air through said receiving space, said inner space, and said air outlet in said cover; and

an urging member for urging said movable sealing part to said second position.

2. The nail driving gun as defined in claim **1**, wherein said fixed sealing part is formed with a plurality of axial grooves.

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